FRD ACTIVITIES REPORT
January 2007

Research Programs

UrbaNet/Urban Dispersion Program

The manuscript "Analysis of Plume Dispersion, Decay, and Peak-to-Mean Excursions for Continuous Tracer Gas Releases in an Urban Core, Oklahoma City, JU03" was submitted for internal ARL review. The manuscript "Analysis of Plume Dispersion Characteristics for Continuous Tracer Gas Releases in Midtown Manhattan, MID05" has completed internal FRD review but submission for ARL review has been postponed pending resolution of data sensitivity issues. The manuscript "Analysis of Plume Dispersion in a Nocturnal Urban Boundary Layer in Complex Terrain, Salt Lake City, URBAN 2000" is presently in internal FRD review. (Dennis Finn, 208-526-0566)

Smart Balloon

A new motor and gearbox on the smart balloon are being tested for reliability and durability. The new gearbox uses metal gears rather than plastic gears and appears to be capable of higher torque delivery without failure of the gears or the output shaft. The new parts should allow the balloon to perform more in-flight operations and allow the balloon to remain in the air for longer periods of time. (Randy Johnson, 208-526-2129)

Perfluorocarbon Tracer Analysis Development

Two columns, approximately 12 and 18 m in length, replaced twin 30 m columns in an effort to shorten the sample run time from almost six minutes. The effort succeeded as we are now able to run a sample about every three minutes and a complete cartridge of 12 samples in about 40 minutes including setup and pre-analysis purge steps. We are presently in the process of evaluating the stability of samples over time (i.e. sample holding time), cleaning tests, and tests measuring what carryover artifacts might be present in low concentration samples following high concentration samples. The results are preliminary but there is some evidence of carryover artifacts and a tendency for calibrations in the high concentration range to drift. We are looking at developing procedures that will eliminate these phenomena. (Dennis Finn, 208-526-0566)

Cooperative Research with DOE NE-ID (Idaho National Laboratory)

Emergency Operations Center (EOC)

Team B attended their first EOC requalification drill of the year on 16 January. The drill centered on an explosion in the BIOSafety Lab at IRC located in Idaho Falls. The new alternate

EOC was utilized for the first time. Conducting a drill at the alternate EOC enabled everyone to become acquainted with the setup and to work in an unfamiliar environment. Team B did not have full access to MDIFF model output, which hindered their usefulness in the EOC. However, this limitation should be remedied shortly. Overall, the drill was a success. (Kirk Clawson, 208-526-2742, and Dennis Finn)

Forecasting

FRD is now planning significant improvements to the INL forecasts. Rather than simply creating text forecasts, the upgraded system will follow the lead of the National Weather Service by creating digital forecast products. These digital forecasts will allow FRD to provide an expanded suite of products for use at the INL. In addition, they will enable a more flexible response to rapidly changing weather events. (Richard Eckman, 208-526-2740, Kirk Clawson, Brad Reese, Neil Hukari, Jason Rich)

Research and Data Analysis

FRD received a request from INL for wind statistics based on the 2006 NOAA INL Mesonet data. These statistics consist of joint frequency distributions binned by wind speed, wind direction, and stability class. They are used as part of the INL environmental assessments. The distributions for 9 different Mesonet towers were completed by the end of January. (Richard Eckman, 208-526-2740)

Research continued on a Bayesian approach for estimating the uncertainty associated with turbulence statistics. Unlike more conventional approaches, the Bayesian method can generate a full probability density function (pdf) for parameters such as the signal variance and integral time scale. With these pdfs, it is easy to produce various uncertainty estimates such as a 95% probability interval. Because of the complexity of turbulent signals, the approach being investigated is based on a numerical procedure called Markov Chain Monte Carlo (MCMC) simulation. (Richard Eckman, 208-526-2740)

Community Monitoring Stations

Display signs of the real-time NOAA INL Mesonet data at the Rexburg and Blackfoot stations have recently become inoperable. These signs were originally installed for the benefit of the students, teachers, and visitors of the schools where these stations are located. Both signs look as though they have a broken signal cable in an underground conduit somewhere between the datalogger and the sign. Funding issues have kept the signs from being repaired. Hopefully the Stoller Corporation, which currently owns the display, will provide the funding to get these signs working again. (Randy Johnson, 208-526-2129)

Other Activities

Papers

Eckman, R.M., R.J. Dobosy, D.L. Auble, **T.W. Strong, T.L. Crawford**: A pressure-sphere anemometer for measuring turbulence and fluxes in hurricanes, 2007: *Journal of Atmospheric and Oceanic Technology*. (In press)

Clawson, K.L., R.G. Carter, D.J. Lacroix, J.D. Rich, N.F. Hukari, R.C. Johnson, and T. Strong: Midtown Manhattan 2005 (MID05), SF_6 Atmospheric Tracer Field Tests. NOAA Technical Memorandum OAR ARL-xxx, Air Resources Laboratory, Idaho Falls, Idaho. (In ARL review)

Finn, D., K.L. Clawson, R.G. Carter, J.D. Rich, C. Biltoft, K.J. Allwine, J.E. Flaherty, and M.J. Leach, 2007: Analysis of Plume Dispersion, Decay, and Peak-to-Mean Excursions for Continuous Tracer Gas Releases in an Urban Core, Oklahoma City, JU2003. (In ARL review)

Finn, D., K.L. Clawson, R.G. Carter, J.D. Rich, K.J. Allwine, and J.E. Flaherty, 2007: Analysis of Plume Dispersion Characteristics for Continuous Tracer Gas Releases in Midtown Manhattan, MID05. (Completed FRD review)

Finn, D., K.L. Clawson, R.G. Carter, J.D. Rich, K.J. Allwine, and J.E. Flaherty, 2007: Analysis of Plume Dispersion in a Nocturnal Urban Boundary Layer in Complex Terrain, Salt Lake City, URBAN 2000. (In FRD review)

Carter, R.G., N.F. Hukari, and J.D. Rich: Identifying Natural Clusters in Eastern Idaho Wind Fields. (In FRD review)

Reviews

We received four Small Business Innovation Research (SBIR) proposals in response to subtopic 8.3.6 R-W, Inexpensive Fast Response Continuous Analyzer for Atmospheric Tracers. We are in the process of reviewing these and hope that one may lead to development of a new tracer analyzer. (Roger Carter, 208-526-2745)

Safety

Donna Mills, Safety Officer, gave a safety presentation on "Choking" at the January staff meeting. The brief presentation covered definition, causes, symptoms, first aid and prevention.

Travel

Donna Mills, 25-31 February 2007, Gaithersburg and Silver Spring, Maryland, for Administrative Officer training.

Training

Donna Mills attended Reimbursable Agreements Training in Gaithersburg, Maryland on January 25th thru January 26th. On January 29th thru January 31st, she was in Silver Spring, Maryland for SAMs and C-request Training.